CONTENTS OF VOLUME 54

January **Number 1**

Review paper
A. S. Rodger, R. J. Moffett and S. Quegan: The role of ion drift in the formation of ionisation troughs in the mid- and high-latitude ionosphere—a review 1

F. S. Kuo, H. Y. Lue, C. M. Huang, C. L. Lo, C. H. Liu, S. Fukao and Y. Muraoka: A study of velocity fluctuation spectra in the troposphere and lower stratosphere using MU radar 31

H. S. S. Sinha: Plasma density irregularities in the equatorial *D*-region produced by neutral turbulence 49

R. Pandey, S. Prakash and H. S. S. Sinha: Formation of ionisation layers responsible for blanketing E_s during daytime counter-electrojet over magnetic equator 63

L. A. Lobachevsky, Yu. V. Gruzdev, V. Yu. Kim, G. A. Mikhaylova, V. A. Panchenko, V. P. Polimatidi, V. A. Puchkov, V. V. Vaskov, P. Stubbe and H. Kopka: Observations of ionospheric modification by the Tromsø heating facility with the mobile diagnostic equipment of IZMIRAN 75

H. J. Strangeways: The Lorentz polarisation term for ionospheric and magnetospheric electromagnetic propagation 87

S. S. Sazhin, A. J. Smith, K. Bullough, M. A. Clilverd, J. M. Saxton, H. J. Strangeways and Gy. Tarcsai: Group delay times of whistler-mode signals from VLF transmitters observed at Faraday, Antarctica 99

Brief report
J. R. Wait: On ELF transmission in the Earth–ionosphere waveguide 109

International Geophysical Calendar 1992 I

February **Number 2**

B. W. Jones, G. J. Miseldine and R. J. A. Lambourne: A possible atmospheric pressure wave from the total solar eclipse of 22 July 1990 113

H. R. Carlon and J. Latham: Enhanced drying rates of wetted materials in electric fields 117

R. A. Akmaev, V. I. Fomichev, N. M. Gavrilov and G. M. Shved: Simulation of the zonal mean climatology of the middle atmosphere with a three-dimensional spectral model for solstice and equinox conditions 119

C. M. Huang, F. S. Kuo, H. Y. Lue and C. H. Liu: Numerical simulations of the saturated gravity wave spectra in the atmosphere 129

Yong-Fu Wu and H.-U. Widdel: Observational evidence of local turbulence production due to gravity wave saturation in the summer mesosphere 143

B. H. Briggs: Radar measurements of aspect sensitivity of atmospheric scatterers using spaced-antenna correlation techniques 153

H. Chandra, G. D. Vyas, H. S. S. Sinha, R. N. Misra and S. Prakash: Ionospheric scintillation observations from SHAR 167

M. D. Fligel: Large-scale irregularities of electron concentration in the southern magnetic anomaly area according to Intercosmos 19 satellite data 173

M. Aydoğdu: Effects of the ionospheric conductivity on the longitudinal structure of the *F*-region equatorial anomaly 179

A. M. Zadorozhny, G. A. Tuchkov, V. N. Kikhtenko, J. Laštovička, J. Boška and A. Novák: Nitric oxide and lower ionosphere quantities during solar particle events of October 1989 after rocket and ground-based measurements 183

J. R. Wait: On VLF radio wave reflection from distant mountain ranges—theory 193

V. H. Kulkarni and M. J. Rycroft: The suppressing effect of field-aligned currents on VLF emissions in the magnetosphere 197

W. J. Burke: Early Trimpi events from lightning-induced electric fields in the ionosphere: an alternative explanation 205

M. Roy and T. Tajima: The effect of hot inhomogeneous plasma on geomagnetic micropulsations 209

March/April **Number 3/4**

V. Yu. Trakhtengerts: Electric field generation in atmospheric convective cells 217

S. L. G. Dutra, A. L. C. Gonzalez, W. D. Gonzalez and A. E. C. Pereira: Downward mapping of quasi-static ionospheric electric fields at low latitudes during fair weather 223

R. A. Medrano-B., M. A. Abdu and I. S. Batista: Ionosphere–atmosphere coupling via stratospheric ozone 231

H. A. von Biel: Ionisation in the Antarctic stratosphere..... 235

C. P. Burke and D. Llanwyn Jones: An experimental investigation of ELF attenuation rates in the Earth–ionosphere duct 243

P. Janhunen: Propagation of the electromagnetic signal from lightning over a non-planar inhomogeneous Earth 251

J. L. Scali and P. L. Dyson: Amplitude statistics of signals reflected from the ionosphere 265

C. E. Meek and A. H. Manson: Angle-of-arrival oscillations in the mesosphere as seen by medium frequency (MF) radar 277

D. Lesicar and W. K. Hocking: Studies of seasonal behaviour of the shape of mesospheric scatterers using a 1.98 MHz radar..... 295

B. Lundborg and M. Lundgren: On the spectral width of chirpsounder signals 311

J. Chen, J. A. Bennett and P. L. Dyson: Synthesis of oblique ionograms from vertical ionograms using quasi-parabolic segment models of the ionosphere..... 323

T. Hagfors: Note on the scattering of electromagnetic waves from charged dust particles in a plasma 333

Y. Murayama, T. Tsuda, M. Yamamoto, T. Nakamura, T. Sato, S. Kato and S. Fukao: Dominant vertical scales of gravity waves in the middle atmosphere observed with the MU radar and rocketsondes 339

S. Sampath, V. Sasikumar and S. Muralidas: Positive and negative ion densities and mobilities in the middle atmosphere over India—rocket measurements 347

B. R. Clemesha, D. M. Simonich, P. P. Batista and H. Takahashi: Evidence for a lack of diffusive control of the atmospheric sodium layer 355

R. H. M. Miesen: Applying weakly nonlinear internal wave theories to solitary waves in the atmosphere 363

R. I. Barnes: Spread-E_s structure producing apparent small scale structure in the F-region 373

R. I. Barnes: An investigation into the horizontal structure of spread-E_s 391

S. I. Liu, Z. D. Tsay and F. S. Kuo: A study of the VHF radar data via a random variance model 401

A. V. Kustov and C. Haldoupis: Irregularity drift velocity estimates in radar auroral backscatter 415

Ya. S. Dimant, A. V. Gurevich and K. P. Zybin: Acceleration of electrons in the ionosphere under the action of intense radio-waves near electron cyclotron harmonics .. 425

G. A. Zherebtsov and O. I. Razuvaev: Electrodynamic structural features of the auroral zone as deduced using data from a meridional chain of ionospheric and magnetic stations 437

T. D. G. Clark: Computer generated K indices adopted by the British Geological Survey 447

M. A. Saunders: The morphology of dayside Birkeland currents 457

R. P. Kane: Sunspots, solar radio noise, solar EUV and ionospheric $foF2$ 463

J. Lemaire and R. W. Schunk: Plasmaspheric wind 467

V. H. Kulkarni and M. J. Rycroft: On the effect of a beam of energetic electrons on the whistler-mode growth rate due to gyroresonant interactions 479

Book review 481

May **Number 5**

IN MEMORIAM

F. W. PAUL GÖTZ (1891-1954)

M. NICOLET: In memoriam (1891-1991) 483

H. U. DÜTSCH: F. W. Paul Götz—the man and his work 485

B. HOEGGER, G. LEVRAT, J. STAEHELIN, H. SCHILL and P. RIBORDY: Recent developments of the Light Climatic Observatory—ozone measuring station of the Swiss Meteorological Institute (LKO) at Arosa..... 497

M. NICOLET: Multiple molecular scattering and albedo action on the solar spectral irradiance in the region of the UVB ($\leqslant$ 320 nm): a preliminary inventory 507

C. L. MATEER and J. J. DELUISI: A new Umkehr inversion algorithm 537

H. U. DÜTSCH and J. STAEHELIN: Results of the new and old Umkehr algorithm compared with ozone soundings..... 557

A. M. LACOSTE, S. GODIN and G. MÉGIE: Lidar measurements and Umkehr observations of the ozone vertical distribution at the Observatoire de Haute-Provence .. 571

V. W. J. H. KIRCHHOFF, Y. NAKAMURA, E. V. A. MARINHO and M. M. MARIANO: Excess ozone production in Amazonia from large scale burnings 583

J. FISHMAN, V. G. BRACKETT and K. FAKHRUZZAMAN: Distribution of tropospheric ozone in the tropics from satellite and ozonesonde measurements 589

J. LONDON and S. C. LIU: Long-term tropospheric and lower stratospheric ozone variations from ozonesonde observations 599

D. CARIOLLE, M. AMODEI and P. SIMON: Dynamics and the ozone distribution in the winter stratosphere: modelling the inter-hemispheric differences 627

A. C. AIKIN and D. J. KENDIG: Tropical behavior of mesospheric ozone as observed by SMM 641

June **Number 6**

***E*-REGION IRREGULARITIES**

K. SCHLEGEL and R. F. PFAFF: Preface 655

G. ROSE, K. SCHLEGEL, K. RINNERT, H. KOHL, E. NIELSEN, G. DEHMEL, A. FRIKER, F.-J. LÜBKEN, H. LÜHR, E. NESKE and A. STEINWEG: The ROSE project. Scientific objectives and discussion of first results 657

G. ROSE: Three-component a.c. *E*-field observations during the rocket and scatter experiment in 1988-1989 under radar auroral conditions in northern Scandinavia 669

K. RINNERT: Plasma waves observed in the auroral *E*-region—ROSE campaign 683

A. FRIKER and F.-J. LÜBKEN: Neutral air density and temperature measurements by the TOTAL instrument aboard the ROSE payloads 693

A. STEINWEG, D. KRANKOWSKY, P. LÄMMERZAHL and B. ANWEILER: Metal ion layers in the auroral lower *E*-region measured by mass spectrometers 703

K. SCHLEGEL: Measurements of electron density fluctuations during the ROSE rocket flights 715

H. LÜHR: *In situ* ionospheric current measurements during ROSE rocket flights: evidence for tilted current layers 725

H. KOHL, E. NIELSEN, K. RINNERT and K. SCHLEGEL: EISCAT results during the ROSE campaign and comparison with STARE measurements 733

P. J. S. WILLIAMS, B. JONES and G. O. L. JONES: The measured relationship between electric field strength and electron temperature in the auroral *E*-region 741

T. R. ROBINSON: The effects of the resonance broadening of Farley-Buneman waves on electron dynamics and heating in the auroral *E*-region 749

J. C. FOSTER and D. TETENBAUM: Phase velocity studies of 34-cm *E*-region irregularities observed at Millstone Hill 759

M. YAMAMOTO, S. FUKAO, T. OGAWA, T. TSUDA and S. KATO: A morphological study on mid-latitude *E*-region field-aligned irregularities observed with the MU radar 769

R. F. PFAFF, J. SAHR, J. F. PROVIDAKES, W. E. SWARTZ, D. T. FARLEY, P. M. KINTNER, I. HÄGGSTRÖM, A. HEDBERG, H. OPGENOORTH, G. HOLMGREN, A. MCNAMARA, D. WALLIS, B. WHALEN, A. YAU, S. WATANABE, F. CREUTZBERG, P. WILLIAMS, E. NIELSEN, K. SCHLEGEL and T. R. ROBINSON: The *E*-region Rocket Radar Instability Study (ERRRIS): scientific objectives and campaign overview 779

J. D. SAHR, D. T. FARLEY, W. E. SWARTZ, J. F. PROVIDAKES and R. F. PFAFF: Observations of 3-m auroral irregularities during the ERRRIS campaigns..... 809

July/August **Number 7/8**

R. TOUMI and J. A. PYLE: On the limitation of steady-state expressions as tests of photochemical theory of the stratosphere 819

R. A. AKMAEV and V. I. FOMICHEV: Adaptation of a matrix parameterization of the middle atmospheric radiative cooling for an arbitrary vertical coordinate grid 829

A. V. SHIROCHKOV and A. P. NAGURNY: On the problem of a connection between ozone dynamics at high latitudes and magnetospheric processes 835

M. I. PUDOVKIN and S. V. BABUSHKINA: Influence of solar flares and disturbances of the interplanetary medium on the atmospheric circulation..... 841

K. SERAFIMOV and M. SERAFIMOVA: Possible radioindications of anthropogenic influences on the mesosphere and lower thermosphere..... 847

D. Yeboah-Amankwah and P. Van der Made: Sign discriminating field mill 851

S. Alex, B. D. Kadam and R. G. Rastogi: A new aspect of daily variations of the geomagnetic field at low latitude 863

B. J. Srivastava: New results on the dip equator and the equatorial electrojet in India 871

B. V. Krishna Murthy, S. P. Perov and M. N. Sasi: Diurnal and semi-diurnal tides in the equatorial middle atmosphere 881

R. S. Dabas, P. K. Banerjee, S. Bhattacharya, B. M. Reddy and J. Singh: Study of equatorial plasma bubble dynamics using GHz scintillation observations in the Indian sector 893

A. Mendes da Costa and L. Rizzo Piazza: Diurnal lower ionosphere electron density variations observed in the South Atlantic Geomagnetic Anomaly and sub-Antarctic region during the occurrence of the major PCA event of 4 August 1972 903

I. A. Lysenko, N. A. Makarov, Yu. I. Portnyagin, B. L. Kashcheev, V. V. Lizogub, V. V. Sidorov and A. N. Fahrutdinova: Seasonal and latitudinal variations of the lower thermospheric tidal winds from meteor radar measurements in the U.S.S.R. 915

A. H. Manson, C. E. Meek, A. Brekke and J. Moen: Mesosphere and lower thermosphere (80–120 km) winds and tides from near Tromsø (70°N, 19°E): comparisons between radars (MF, EISCAT, VHF) and rockets 927

Chao-Song Huang and Jun Li: Interaction of atmospheric gravity solitary waves with ion acoustic solitary waves in the ionospheric *F*-region 951

V. N. Zvezdin and S. V. Fridman: Regimes of ionospheric turbulence from fractal analysis of satellite radio signal scintillations 957

B. Mathew, K. N. Iyer and B. M. Pathan: Patchy occurrence of VHF scintillations at tropical latitudes 963

L. Thomas, I. Astin and I. T. Prichard: The characteristics of VHF echoes from the summer mesopause region at mid-latitudes 969

P. K. Bhuyan and Yinn Nien Huang: Faraday polarization fluctuations associated with amplitude scintillations at Lunping 979

L. Schlamminger: Aurora borealis lags during the Middle Ages 989

V. G. Vlasov, V. V. Klimenko, G. K. Matafonov and A. V. Tashchilin: Collective heating and radiation dynamics of the auroral ionospheric *F*2-region 995

S. E. Pryse and L. Kersley: A preliminary experimental test of ionospheric tomography 1007

E. L. Afraimovich, A. I. Terekhov, M. Yu. Udodov and S. V. Fridman: Refraction distortions of transionospheric radio signals caused by changes in a regular ionosphere and by travelling ionospheric disturbances 1013

F. W. Menk, B. J. Fraser, H. J. Hansen, P. T. Newell, C.-I. Meng and R. J. Morris: Identification of the magnetospheric cusp and cleft using *Pc*1–2 ULF pulsations 1021

C. O. Hines: Mesospheric VHF echoing layers: an interpretation of certain observations in terms of wave scavenging 1043

R. L. Dowden and C. D. D. Adams: Ionospheric heating by VLF transmitters? 1051

M. A. CLILVERD, A. J. SMITH and N. R. THOMSON: The effects of ionospheric horizontal electron density gradients on whistler mode signals 1061

M. A. CLILVERD, N. R. THOMSON and A. J. SMITH: Observation of two preferred propagation paths for whistler mode VLF signals received at a non-conjugate location 1075

Brief report
M. VERDECCHIA, G. VISCONTI and G. PITARI: Radiative perturbation due to the eruption of El Chichón: effects on ozone 1081

Book reviews 1085

September **Number 9**

THE OZONE, CLIMATIC GASES AND GREENHOUSE EFFECT

P. TAALAS and E. KYRÖ: 1987–1989 total ozone and ozone sounding observations in Northern Scandinavia and Antarctica, and the climatology of the lower stratosphere during 1965–1988 in Northern Finland 1089

C.-D. SCHÖNWIESE: Observational signs of greenhouse-gas-induced climate change, with special reference to northern latitudes 1101

Å. RABBE and S. H. H. LARSEN: Ozone variations in the Northern Hemisphere due to dynamic processes in the atmosphere 1107

K. HENRIKSEN, T. SVENØE and S. H. H. LARSEN: On the stability of the ozone layer at Tromsø 1113

K. HENRIKSEN, S. CLAES, T. SVENØE and K. STAMNES: Spectral UV and visible irradiance measurements in the Barents Sea and Svalbard 1119

REGULAR PAPERS

Review paper
O. PINTO JR, W. D. GONZALEZ, I. R. C. A. PINTO, A. L. C. GONZALEZ and O. MENDES JR: The South Atlantic Magnetic Anomaly: three decades of research 1129

M. I. PUDOVKIN and S. V. BABUSHKINA: Atmospheric transparency variations associated with geomagnetic disturbances 1135

R. P. KANE: Long-term variation of stratospheric temperature at the North Pole 1139

R. O. MANUILOVA and G. M. SHVED: The 4.8 and 9.6 μm O_3 band emissions in the middle atmosphere 1149

A. MENDES DA COSTA and L. RIZZO PIAZZA: *D*-region electron density diurnal changes observed in association with the PCA event of July 1974 1169

A. D. KALIKHMAN, N. N. KLIMOV, G. K. MATAFONOV and A. V. TASHCHILIN: Simulation of ionosonde observations of ionospheric holes 1177

T. A. TH. SPOELSTRA: Combining TID observations: NNSS and radio interferometry data 1185

R. SEKAR and R. SRIDHARAN: Validity of the estimates of night-time meridional winds made from bottomside ionograms 1197

R. P. KANE: Solar cycle variation of $foF2$ 1201

M. GOLA, A. W. WERNIK, S. J. FRANKE, C. H. LIU and K. C. YEH: Behaviour of HILAT scintillation over Spitsbergen 1207

October **Number 10**

WAVE AND TURBULENCE ANALYSIS TECHNIQUES

M. J. RYCROFT: Preface 1215

J. L. LACOUME, M. GAETA and W. KOFMAN: Source separation using higher order statistics 1217

F. LEFEUVRE and J. L. PINÇON: Determination of the wave-vector spectrum for plasma waves and turbulence observed in space plasmas 1227

J. L. PINÇON and F. LEFEUVRE: The application of the generalized Capon method to the analysis of a turbulent field in space plasma: experimental constraints 1237

N. IWAMA, M. YOSHIOKA, F. SAKAGUCHI, B. CABRIT and D. GRÉSILLON: Three-channel autoregressive bispectral analysis for the laser scattering measurement of turbulence 1249

E. COSTA, SU. BASU and S. BASU: Application of three cross-correlation techniques to spaced-receiver data 1257

E. L. AFRAIMOVICH, O. M. PIROG and A. I. TEREKHOV: Diagnostics of large-scale structures of the high-latitude ionosphere based on tomographic treatment of navigation–satellite signals and of data from ionospheric stations 1265

V. E. KUNITSYN and E. D. TERESHCHENKO: Determination of the turbulent spectrum in the ionosphere by a tomographic method 1275

D. LAGOUTTE, J. C. CERISIER, J. L. PLAGNAUD, J. P. VILLAIN and B. FORGET: High-latitude ionospheric electrostatic turbulence studied by means of the wavelet transform 1283

A. I. TEREKHOV: Reconstruction of travelling ionospheric disturbances parameters by a tomographic method 1295

P. F. DENISENKO, N. A. ZABOTIN, D. S. BRATSUN and S. A. PULINETS: The global distribution of ionospheric small-scale irregularities from topside sounding data 1303

JA. I. LIKHTER, V. I. LARKINA and G. L. GDALEVICH: Small-scale fluctuations of magnetic and electric components of the ELF and VLF wave fields in the sub-auroral topside ionosphere: stochastic characteristics of the wave field 1311

J. BOŠKOVÁ, F. JIŘÍČEK, J. ŠMILAUER, P. TŘÍSKA, B. V. LUNDIN, D. R. SHKLYAR and E. E. TITOVA: LHR whistlers and LHR spherics in the outer ionosphere 1321

B. SCHÄNING: Long-term variation of thunderstorm activity over the Amazon basin during southern summer as derived from atmospheric noise measurements 1329

A. I. SUKHORUKOV: On the excitation of the Earth–ionosphere waveguide by pulsed ELF sources 1337

P. I. VELLINOV, CHR. W. SPASSOV and S. I. KOLEV: Ionospheric effects of lightning during the increasing part of solar cycle 22 1347

R. L. DOWDEN, C. D. D. ADAMS and P. D. COTTON: Use of VLF transmissions in the location and mapping of lightning-induced ionisation enhancements (LIEs) 1355

R. H. W. FRIEDEL and A. R. W. HUGHES: Trimpi events on low latitude paths: an investigation of gyroresonance interactions at low *L*-values 1375

November/December **Number 11/12**

Review paper
R. J. STENING: Modelling the low latitude *F*-region 1387

C. G. DESHPANDE and A. K. KAMRA: Short time variations in atmospheric electrical parameters 1413

E. KNUDSEN and S. ISRAELSSON: On the effect of space charge generation caused by evaporation 1421

R. FURRER, W. DÖHLER, H.-J. KIRSCH, P. PLESSING and U. GÖRSDORF: Evidence for vertical ozone redistribution since 1967 1423

Å. RABBE and S. H. H. LARSEN: Ozone 'minihole' over Northern Scandinavia 1447

K. LABITZKE and H. VAN LOON: On the association between the QBO and the extratropical stratosphere 1453

M. E. HAGAN, F. VIAL and J. M. FORBES: Variability in the upward propagating semi-diurnal tide due to effects of QBO in the lower atmosphere 1465

Y.-F. WU and H.-U. WIDDEL: Saturated gravity wave spectra derived from foil chaff experiments performed during campaign 'DYANA' at 44°N (Biscarrosse, Southwest France) 1475

A. D. DANILOV and U. A. KALGIN: Seasonal and latitudinal variations of eddy diffusion coefficient in the mesosphere and lower thermosphere 1481

L. X. WHITEHEAD and E. C. BUTCHER: On the phase changes between oscillations in the group and phase paths due to TIDs 1491

J. BREMER: Ionospheric trends in mid-latitudes as a possible indicator of the atmospheric greenhouse effect 1505

G. G. BOWMAN: Some aspects of mid-latitude daytime ionospheric disturbances 1513

H. A. VON BIEL: Assessing the correlated signal power in *D*-region partial reflections 1523

R. BARR: A simple theoretical model of the diffraction of VLF electromagnetic waves by the Antarctic icecap 1527

C. A. Onwumechili and P. O. Ezema: Latitudinal and vertical parameters of the equatorial electroject from an autonomous data set 1535

N. Balan, B. Jayachandran, R. Balachandran Nair, S. P. Namboothiri, G. J. Bailey and P. B. Rao: HF Doppler observations of vector plasma drifts in the evening *F*-region at the magnetic equator 1545

A. J. Stocker, F. Honary, T. R. Robinson, T. B. Jones, P. Stubbe and H. Kopka: EISCAT observations of large scale electron temperature and electron density perturbations caused by high power HF radio waves 1555

M. G. Gusev and O. A. Troshichev: Simultaneous ground-based observations of polar cap arcs and spacecraft measurements of particle precipitation 1573

M. J. Laird: On the guidance of whistlers by density gradients 1593

M. J. Laird: Mode theory of whistler ducts: integrated group delay times 1599

G. Gustafsson, N. E. Papitashvili and V. O. Papitashvili: A revised corrected geomagnetic coordinate system for Epochs 1985 and 1990 1609

P. Janhunen: Three-dimensional stabilization mechanism for the auroral Farley–Buneman instability 1633

Book reviews 1645

Volume Contents and Author Index i